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ABSTRACT OF THE DISCLOSURE

An optical-path-superposing-and-separating unit superposes optical paths of two inputted signal lights with each other, and then separate them. A non-linear waveguide is arranged in an area where the optical paths are superposed with each other. First and second optical waveguide are connected to the optical path superposing-and-separating unit. The second optical waveguide has a longer optical path than the first optical waveguide. A control light is introduced to the non-linear waveguide. An interference separator distributes the inputted two signal lights depending on a phase difference therebetween. Third and fourth optical waveguides connect the optical-path-superposing-and-separating unit to the interference separator. Optical path lengths of the third and fourth optical waveguides are set such that a delay time of the signal light propagating through the first optical waveguide is canceled at time when the two signal lights reach the interference separator.